

# MANITOBA INDUSTRIAL TOPICS

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THE INDUSTRIAL DEVELOPMENT BOARD  
OF MANITOBA

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Greater  
Winnipeg's  
New Radio  
Station

190 Feet of Steel,  
Which Carries the  
"1340" Signal



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# ALL ATTENDANCE RECORDS BROKEN

*Great interest displayed in annual meeting of Industrial Development Board.*

*....Reports show Progress ....Instructive address by Mr. Donald of Montreal.*

★ ★ ★

ESTABLISHING an all-time attendance record of three hundred and eighteen the twentieth annual meeting of the Industrial Development Board of Manitoba was held in the Royal Alexandra Hotel on April 16. A large number were present from outside cities and towns throughout the province. The presiding officer was Maurice C. Gilman, chairman of the board. The guest speaker was J. R. Donald, O.B.E., B.A., B.Sc., of Montreal. Gratifying reports were given covering the years' manufacturing activities, which revealed satisfactory reconversion progress from war to peacetime conditions.

Those at the head table were Hon. R. F. McWilliams, K.C., Lieutenant Governor; Hon. J. S. McDiarmid, Minister Natural Resources and honorary chairman; Mayor G. C. Coulter, K.C., honorary vice-chairman; A. W. Trueman, president University of Manitoba; Mayor G. C. MacLean. St. Boniface, honorary vice-chairman; W. A. Mather, vice-president Western Lines C.P.R. and honorary vice-chairman of the board; W. R. Devenish,

vice-president C.N.R. Western region and honorary vice-chairman of the board; M. D. Grant, president Winnipeg Board of Trade; G. S. Mathieson, president Winnipeg Grain Exchange; W. J. Macdonald, president Manitoba Chamber of Mines; H. W. Manning, president Canadian Club of Winnipeg; Herbert Cottingham, chairman Manitoba Power Commission; J. N. T. Bulman, immediate past chairman; D. W. Dyson, vice-chairman Manitoba branch Canadian Manufacturers Assn.; C. C. Miller, president Manitoba Associated Boards of Trade; H. B. Smith, president Western Associated Boards of Trade; F. C. King, president Trades and Labor Council; Victor Sifton, publisher Winnipeg Free Press; A. W. Moscarella, business manager Winnipeg Tribune; J. W. Sanger, first vice-chairman; R. J. Prittie, second vice-chairman; W. H. Carter, honorary vice-chairman; Ald. J. G. Glassco, honorary vice-chairman; Ald. John Popkin, representing Mayor of Brandon.

Mr. McDiarmid introduced the guests from outside Greater Winnipeg, coupled with an appeal to all commu-

nities in Manitoba to join forces in the valuable work being done by the board in peacetime industrial development. He suggested they make full use of the organization.

Those present were: Archibald Blackie, Kilowna, B.C., retired Winnipeg chemist; L. R. Key, Minneapolis; F. R. Longworth, L. J. Rust, president Board of Trade and J. C. Maillard, Brandon; Mayor J. C. Preece, Ald. H. L. Henderson, E. M. Mackey, ex-mayor J. A. Cavers, Clayton Lowry and A. Wynne, Board of Trade, Portage la Prairie; J. N. McFadden, K.C., and H. J. Moberley, president and secretary Board of Trade, Dauphin; H. Bobrowski, Morris; L. E. McCall, Selkirk; W. S. McPhedrain, Sifton; Dr. Toni, chairman Board of Trade, J. J. Siemens, D. K. Friesen and D. A. Miller, Altona; B. D. Penner, Steinbach; F. C. Roberts, Homewood; C. V. Kerr, Neepawa; Geo. W. Ternent, Cartwright; Reeve Percy Beachell, Rosser; G. W. Walkey, president Board of Trade, Carberry; Mayor L. J. Pulfer, Beausejour; Mayor A. R. Paulley, W. R. Lawrie, president, Dr. McKay, M. J. G. McMullen, B.

Three distinguished citizens at head table, from right: Hon. R. F. McWilliams, Lieut. Governor of Manitoba; Hon. J. S. McDiarmid, Minister of Natural Resources and Hon. Chairman of the Board, and His Worship, Garnet C. Coulter, K.C., Mayor of Winnipeg and Hon. Vice-Chairman.





One of those off the record pre-meeting chats. From left: Maurice C. Gilman, J. R. Donald, of Montreal; G. S. Mathieson, president, Winnipeg Grain Exchange, and M. D. Grant, President Winnipeg Board of Trade.

R. Wolfe, B.J. Sequin, all members of Board of Trade, Transcona.

Messages of regret at inability to be present were read by the chairman from Rt.-Hon. W. L. MacKenzie King, prime minister of Canada; Hon. John Bracken, Progressive-Conservative opposition leader, and Mr. Macnamara, deputy minister Department of Labor,

Ottawa. Hon. Stewart S. Garson, Manitoba's premier, was unable to attend because of illness.

The nominating committee's slate of officers and members of the executive committee for this year was adopted unanimously. The list appears on page 2.

Printed copies of reports by Mr. Gilman and the various committees

were distributed. Condensed reviews appear in this issue of "Industrial Topics."

The guest speaker Mr. Donald was introduced by Mr. Sanger, first vice-chairman. A vote of thanks was extended by Mr. Prittie. They both paid graceful tributes to that distinguished gentleman.

The candid camera interrupted a conference. Those participating were, from right: Hon. R. F. McWilliams, K.C., Lieut.-Governor; J. R. Donald, M. C. Gilman, Ald. John Popkin, pinch-hitting for Mayor of Brandon; J. N. T. Bulman, immediate past Board Chairman; Victor Sifton, publisher Winnipeg Free Press, and Ald. J. G. Glassco, Hon. Vice-Chairman.



# The Chairman's Report

The gross value of Manitoba's production in 1945 was estimated at \$330,000,000, a decrease of only \$20,000 from the preceding year's wartime total of \$304,000,000. That is part of an optimistic review given by Maurice C. Gilman, chairman of the Industrial Development Board, in his annual report. This showing was made in spite of the war's end and reconversion readjustments during the latter six months.

Inquiries and negotiations with industrial firms checking on manufacturing possibilities in this province exceeded any records within the last twenty years. Forty-six new industries were established in 1945, many comparatively small, but capable of development. A complete list was published in the last issue of "Industrial Topics."

Mr. Gilman cites as one problem lack of manufacturing premises in various communities ready to move into. This delays the establishment of new plants and expansion of existing firms. He suggests as a remedy conversion of idle wartime premises into what was termed "incubator buildings" on reasonable rental rates.

Reconversion difficulties have not been so serious in Manitoba as in provinces where war production was more

extensive. Except for minor curtailment of employment and production in the local aircraft industry and the Cordite plant there had been no evidence of abnormal dislocations.

An important development, now well advanced, is the industrial survey of Manitoba's resources sponsored by the Board. Referring to this undertaking Mr. Gilman said:

"I am pleased to state that we received hearty co-operation from the Manitoba Government, the Dominion Government and the City of Winnipeg in providing some 60% of the estimated cost, both of the Industrial Survey and of the later added expense to the Board of our anticipated efforts during the next two years of implementing the survey and going after the needed new industries. I am also glad to announce that our Survey Fund Committee under the capable chairmanship of our immediate past chairman, Mr. J. N. T. Bulman, has successfully secured the remainder of the necessary funds from a considerable number of public spirited citizens of Manitoba.

"The well known firm of consultants, J. T. Donald & Co. Ltd., were engaged to direct our survey, special emphasis being given them to advise on possible uses that might be made of the unused



MAURICE C. GILMAN  
Board Chairman, who presided at the annual meeting.

government war plants, such as the Transcona Cordite Plant and the buildings of the aircraft industry at Stevenson Field. Additional office space and personnel have been engaged for some months in the work of this survey, which we expect to complete later in 1946.

"The Industrial Development Board is indebted to the Press and the Radio for their fine contribution throughout the year in reporting faithfully and fully the work and activities of the Board in their news columns and editorially. To them we express our appreciation."

Mr. Gilman's report and also those made by the committee chairmen, were fully recorded in the booklet distributed at the annual meeting.



This quartet obviously agree all is well with Manitoba. From left they are: D. W. Dyson, chairman Manitoba branch Canadian Manufacturers' Assn.; W. H. Watt, chairman New Industries Committee; R. McN. Pearson, Deputy Minister of Finance, and W. J. Macdonald, president Manitoba Chamber of Mines.





R. A. Merritt, Made-in-the-West chairman and R. A. Prittie, Second Vice-Chairman, got a kick out of story told by Daniel Sprague, Established Industries.

# Committee Reports Show Progress

## MADE-IN-THE-WEST ACTIVITIES

R. A. Merritt recorded well attended meetings which dealt mostly with efforts to promote the sale of Western-made goods. This included a series of broadcasts over CKRC, entitled "Western Industry on the March", which created a favorable response. When the war ended, arrangements were made with the same station to sponsor a nightly newscast for six months, preceded each time by a brief historical review of industrial enterprises in this province.

The seventeenth edition of "Directory of Western Manufacturers," bigger and better than ever, was published and 11,000 copies distributed to all parts of Western Canada. The book was carefully revised and brought up-to-date. Thanks to advertising support from 141 firms there was a net profit of \$273.26.

Members of this committee are R. A. Merritt, chairman; E. J. Ransom, vice-chairman; G. E. Carpenter, M. C. Gilman, T. G. Hall, A. M. Hunter, J. S. Jones, C. C. Kent, M. J. G. McMullen, L. A. Mintie, J. F. Morrison, H. A. Morton, A. M. Rankin, W. H. Rice, M. Steinkopf, A. K. Stephens and A. H. Warwick.

## ESTABLISHED INDUSTRIES

Daniel Sprague stated that the annual survey made by the board indicates gross value of Manitoba's manufactured products last year will approximate \$330,000,000. This is a decrease of less than six per cent compared with 1944, due largely to war order cancellations and closing of the Cordite and certain aircraft plants. Out of 101 firms reporting on employment, 81 record increases, and only 20 decreases.

Conversion from war to commercial work in Manitoba is being conducted in a satisfactory manner. Plant and equipment facilities have been expanded in spite of con-

struction difficulties. Confidence in the future is shown by manufacturers.

Committee members are Daniel Sprague, chairman; Jos. Merrett, vice-chairman; M. C. Gilman, R. F. Griffiths, J. D. McDonald, R. A. Merritt, Max Nitikman, Chas. Swinford, H. B. Wilcox and J. G. Young.

## THE SOIL PRODUCTS

Randolph Patton reported definite progress covering the uses of waste straw and in the extraction of edible oils. Expansion in food industries, new developments in canning and dehydration of vegetables and increased acreage in sugar beet planting also received active support.

Dr. H. H. Saunderson completed a detailed study on the manufacture of pulp, paper and wallboard from waste straw. Due to its technical and confidential nature this report was not published, but was acted upon by the board in collaboration with the Manitoba Department of Agriculture.

Sufficient Regent wheat straw for test runs was sent to Iowa State College at Ames. A recent letter from Dr. L. K. Arnold, Research Associate Professor of Chemical Engineering says: "We have already made several runs of the board and the material looks promising."

Detailed reports on the Pilot Flax Fibre Mill in Portage la Prairie, and Dr. L. H. Reyerson's address, sponsored by the committee, on the possibility of making linen fabrics from flax straw and alpha cellulose from aspen or poplar, appeared in recent issues of "Industrial Topics".

Some study was devoted to ways and means of encouraging an increased acreage of oil seed flax in Manitoba. The Co-op. Vegetable Oils' new plant for extraction of oil from sunflower and rape seed is now operating at Altona. A pilot plant for processing oil seeds is being installed at the Morden Experimental Farm.

The committee members are Randolph Patton, chairman; Dr. H. H. Saunderson, vice-chairman; Dr. J. A. Anderson, L. P. Bancroft, J. E. Blakeman, J. N. T. Bulman, W. G. Cowie, T. P. Devlin, Prof. J. H. Ellis, L. T. Force, E. H. Gamble, C. B. Gill, M. C. Gilman, Prof. T. J. Harrison, T. O. F. Herzer, W. A. Landreth, N. C. MacKay, J. M. McCabe, Hamilton McClean, D. G. McKenzie, W. O. S. Meredith, Dr. K. W. Neatby, F. H. Nicholson, Dr. P. J. Olson, R. McN. Pearson, Fred V. Seibert, Frank D. Shepherd, Dr. H. B. Sommerfeld, T. A. Sparks, and Prof. W. J. Waines.

### MANITOBA INDUSTRIAL TOPICS

J. N. T. Bulman, honorary editor-in-chief, reported on the appointment of a magazine committee as recommended at last year's annual meeting. The members are: Mr. Bulman, chairman; A. H. Warwick, L. T. Barratt, W. G. Cowie, R. A. Sara and F. C. Pickwell, the editor. Regular conferences are held for a discussion of each issue.

The magazine has ended its fifth year. During 1945 11,900 copies were printed, an average of about 2,000 per issue. In addition industrial firms featured frequently ordered a large number of copies for distribution to their clients. Six issues carried 330 illustrations and 23 major articles.

Letters of appreciation of our magazine, Mr. Bulman said, were received during the year, notably from the Lieutenant-Governor of Manitoba, the Mayor of Winnipeg, chairman of Manitoba Power Commission and many others, indicating that the purpose of the board in its publication is being achieved.

Perhaps the sincerest appreciation of our magazine is indicated by the number of publications which had adopted the format and style of "Topics," and the steadily increasing flow of requests received from points in the United States, Overseas, and from all across Canada, for copies and information regarding its production and editing.



Manitoba is making good progress under constructive leadership. That judgment was rendered, from left, by R. A. Sara, the Board's managing secretary; H. W. Manning, managing director Great-West Life and president of Canadian Club of Winnipeg; Ald. J. G. Glassco; and C. C. Miller, Portage la Prairie, president Manitoba Associated Boards of Trade.



Three wise men collaborate on Manitoba's future welfare. From left: A. W. Trueman, president University of Manitoba; Mayor Garnet C. Coulter, K.C., and Herbert Cottingham, chairman Manitoba Power Commission.

## GROWTH OF MANITOBA INDUSTRIES

Year	No. Establishments	Capital Invested	No. Employees	Salaries and Wages	Gross Value of Production
1933.....	1,010	\$100,074,404	18,871	\$18,687,430	\$ 83,934,777
1934.....	1,013	104,865,130	19,828	19,932,594	97,693,242
1935.....	1,035	116,127,822	21,196	22,403,193	109,621,432
1936.....	1,011	118,515,841	22,507	24,490,299	122,050,502
1937.....	1,043	119,363,026	23,706	27,198,978	140,805,451
1938.....	1,072	114,367,743	23,507	27,195,923	131,770,280
1939.....	1,087	119,659,365	23,910	28,444,798	134,293,595
1940.....	1,171	132,978,496	26,679	31,940,562	167,919,165
1941.....	1,184	163,489,471	32,262	40,894,267	211,534,751
1942.....	1,287	175,902,477	37,519	51,605,139	259,554,350
1943.....	1,245	173,752,507	37,003	53,841,825	304,867,912
1944.....	*1,318	*177,000,000	*40,000	*55,000,000	*350,000,000
1945.....	*1,364	*165,000,000	*39,000	*53,000,000	*330,000,000

\* Estimated

# ADVENTURES IN CHEMICAL ENGINEERING...

*Illuminating Address by J. R. Donald, Montreal, Director General of Chemicals and Explosives, Dept. of Munitions and Supply, at Annual Meeting of Industrial Development Board.*

## *In Wartime*

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REFERENCE has been made to the survey by my firm covering the resources of Manitoba and the possibilities of industrial expansion. It is not my intention to discuss these problems tonight, because many of you would be familiar with much of what I might say. I would like, however, to tell you that it has been a great pleasure and a stimulating experience to meet so many of your leading citizens and to gain something more than a superficial knowledge of your great province. We have been very much impressed by the spirit of co-operation which exists between your Government, industry and this board. We are trying to assess the resources with a view to the expansion of industry and are endeavoring to bring a fresh point of view to this problem.

I propose to tell you something of Canada's war effort in the explosives and chemical field and my own experience in this connection, and not weary you with a lot of statistics. It has been stated by the Hon. Mr.

Howe that the Canadian chemicals and explosives program was one of the most successful efforts of the Department of Munitions and Supply. I can go further and tell you that Canada met all the demands placed on her and that, starting from practically scratch, we developed a great chemical and explosives industry. Free from bombing and incidents of war, we were able to build our plants more quickly than in the United Kingdom. Our production became available in the critical days of 1941, when Britain stood alone and every pound of supplies was worth untold value.

It is true that the chemical industry in the United Kingdom and the United States did a very fine job, but, in proportion to her population, Canada's effort in this field was notably larger than that of the United Kingdom and even the United States. It must also be admitted that the German explosives and chemical program was a fine technical performance.

I wonder how many of you realize just how fundamental to the war effort was an adequate supply of that wide variety of products included in the chemicals and explosives program: Bombers, tanks, guns, battleships and rifles serve one main purpose. That is to carry and deliver explosives. Explosives include a wide range of products: Propellants such as cordite and nitrocellulose powders to propel shells from guns, to drive rockets through the air and even to assist in launching planes; high explosives such as T.N.T., R.D.X., amatol, torpex, etc., to load into bombs, shells, torpedoes and other missiles; and then a list of sensitive explosives such as tetryl, lead azide, fulminate of mercury and styphnate, all required in the loading of ammunition for fuses, primers, caps and other items in the detonating chain.

### EXPLOSIVES AND CHEMICALS

To manufacture this wide range of explosives requires large plants and a big chemical industry to supply the intermediates and raw materials from which the explosives are made. Acids, ammonia, solvents, chlorine, aniline, chlorates, glycerine and toluol were all required necessitating new plants and expansion to others. In this war explosives were produced on a scale much greater than ever before in history to meet the demands arising from the vast armies involved, the high fire-power of modern weapons and the mechanization of equipment.

But, in addition to the chemicals needed as an intrinsic part of the explosives program, we were also required to construct plants and produce chemicals for specialized uses to meet demands arising from new conditions of warfare. Smoke screens, as protection against air-raids and as cover for troop movements, became absolutely essential in the face of the high rate of fire of modern weapons. Chemical smokes required large quantities of phosphorus and hexachlorethane. Hexachlorethane was manufactured from acetylene and chlorine. Acetylene meant calcium carbide. Phthalic anhydride was required as a base for plasticizers for explosives, for insect repellents and for plastics. Modern planes required fuels of high octane rating. These are obtained by blending gasoline with a chemical fuel manufactured from refinery gases and known as alkylate. Chemical warfare always threatened, and had to be countered by building plants to produce activated carbon for gas-masks and mustard gas for offensive purposes. Even flame-throwers required a fuel containing a chemical which made their long flames possible. And over and above all these requirements was the demand for synthetic



James Richardson Donald, O.B.E., B.A., B.Sc.





**J. W. SANGER**  
First Vice-Chairman, who introduced  
the guest speaker.

rubber involving a series of large chemical plants and elaborate technical equipment, which, though not a part of the explosives and chemical program was intimately associated with it.

### MILLIONS INVESTED

I do not need to stress to this audience how hard it is to spend \$1,000,000 quickly, yet efficiently, and how many man-hours are involved. You will appreciate something of the magnitude of these problems when I tell you that the explosives and chemical program built and operated some thirty-two plants, costing over \$1,000,000,000, and that the annual value of the output almost equalled the capital cost of some plants. We also erected ammunition filling plants costing \$60,000,000.

The largest and most diversified of the explosive plants was at de Salaberry near Montreal. It is spread over some 962 acres, cost over \$14,000,000, produced cannon powders and rifle powders of the nitrocellulose type, T.N.T., D.N.T., and tetryl — a very complete and self-contained plant. It was originally planned early in 1940 to produce propellants and T.N.T. for the French Government.

I shall never forget a meeting with the French Purchasing Commission in New York in the late Spring of 1940 to decide upon the final contractual details. At the meeting were some twelve or fifteen, mostly members of the French Purchasing Committee. The

news from France was terrible. As we sat there on a very hot day with the windows open we could hear newsboys shouting out the headlines — one disaster after another. France was falling. The faces of French officials were white and drawn. There we sat trying to discuss technical questions and contractual details. It was the most difficult problem in concentration I have ever experienced.

But before this plant came into production in February, 1941, we had one other hair-raising experience. Within a few weeks before it was scheduled to start we were told that Lord Haw Haw had announced on the radio that the Germans knew this plant was going to be built, but that it would never come into operation. We had an uneasy few weeks, but it started operation on schedule and did a great job. We never had any cases of sabotage and Lord Haw Haw is no more.

We built four large explosive plants. Two manufactured cordite, the British Service propellant. These cordite plants were located at Nobel, Ontario, and in Winnipeg. Many of you are familiar with the local undertaking, but there are some details which I think may be of interest.

### THE CORDITE STORY

When the necessity arose in the hectic summer of 1940 to expand our explosives program, the general question of location had to be decided.

**R. J. PRITTE**  
Second Vice-Chairman, who moved the  
vote of thanks.



**FRANK E. HALLS**  
Honorary Treasurer.

Knowing the overall program of the Department of Munitions and Supply, I felt it was desirable to decentralize and to get outside the central Ontario and Quebec areas. Conditions of paramount importance for a cordite plant were labor, water, fuel and power, in a location preferably outside a large centre of population.

Greater Winnipeg had labor and power, and coal from Canadian sources could be used, but the water supply seemed difficult. This was overcome with the assistance of Hon. Mr. McDiarmid, your Government and municipal authorities, and the decision made to build at the Transcona site. It was a radical departure. There were gloomy predictions about high costs, due to the more severe climate, danger from prairie dust, possible difficulties from labor of non-British origin and the relatively long distance from other similar operations. None of these were warranted.

The plant did a magnificent job. We never had any indications of sabotage. Costs were comparable with those of the eastern plants and we found Winnipeg labor of the best. The technical staff, chemists, engineers and others were largely recruited from Manitoba, and the technical efficiency of the plant was fully as good as any other. At no plant was there a higher morale or a better spirit. The success of the cordite plant fully demonstrated

*(Continued on page 12)*



Three of the original founders of the Industrial Development Board of Manitoba reminisce with considerable satisfaction as they view the record attendance. From left they are E. T. Leech, K.C., member Executive Committee; W. H. Carter, Hon. Vice-Chairman, and R. J. Shore, member Executive Committee.



From left: A. H. Warwick, Geo. Gooderick, Allan Harris and L. E. Ostrander give some constructive information to A. S. Townshend, of J. T. Donald & Co. Ltd., Montreal.



J. J. Siemens, at right, and D. K. Freisen, Altona industrialists, discuss latest developments at their vegetable oils plant between courses.



Electrical experts discuss Manitoba's outlook. From left: F. J. Malby, City Hydro; Ald. Glassco, for Queen-Hughes, a Hong Kong veteran, and G. Sterns.



On the left: Geo. W. Ternent, Cartwright, enthuses over industrial possibilities in his district to Dr. Sterns, Ernest Nyman and S. C. Lynn.



J. A. Marion discusses prospects for his new brick manufacturing plant with W. H. Carter and E. T. Leech.



New British Trade Commissioner gets a line of conditions in Manitoba. From left: D. Broad, British Commissioner; Mayor G. C. MacLean, St. Boniface; Randolph Patton, chairman Soil Products Committee, and Daniel Sprague, chairman Established Industries.



Two young ladies are thrilled with the proceedings. From left they are: Frances Herba, Stan Hayes, Mrs. Jack Boyd and her husband.



look. From left: E. V. Caton, Winnipeg Electric; Hon. C. E. Greenlay, former City Hydro manager; and G. E. Miles, member Executive Committee.



On the right: Portage la Prairie Foursome, from right: Hon. C. E. Greenlay, Lorne Carter, agricultural representative; Mayor J. C. Preece and W. C. Lowry.

that, insofar as operations are concerned, highly technical industrial enterprises can be as successfully carried out in Manitoba as anywhere else in Canada. The establishment of such enterprises is a matter of economics, rather than technical feasibility.

The difficulties of converting the Transcona cordite plant into an industrial operation are, I think, self-evident, and are common not only to this one but to other explosive plants in Eastern Canada and the ammunition filling plants as well. To date no post-war industrial use has been found for any of these. Similar difficulties exist in the United States and Great Britain.

It is our opinion that explosive manufacturing buildings, widely spread over a site, offer little possibility of future use. In view of high costs of maintenance we believe they could be disposed of, or scrapped, without depreciating the industrial value of the site.

On the other hand administrative buildings, power stations, laboratories, other service facilities and the more centralized buildings should be maintained until the possibilities of utilization have been fully explored and the available facilities of the site fully advertised. It should be borne in mind that post-war possibilities and developments are only beginning to emerge, and sufficient time should be allowed for them to take form before the overhead facilities are dispersed.

## UNIQUE FALLS DEVELOPMENT

The largest chemical plant was located at Niagara Falls. It covered some 770 acres and cost approximately \$16,000,000. It produced nitroguanidine and ammonia, but also included the largest sulphuric acid plant in Eastern Canada. It was one of our most interesting undertakings and the only plant in the Allied world producing this valuable chemical, nitroguanidine, or picrite. I would like to tell you something of its history.

In the early summer of 1940 a cable came over my desk asking Canada if she could create plants to produce 55 tons per day of nitroguanidine. Almost all we knew about this product was

that it was a comparatively rare organic chemical made from cyanamid. We were being asked to produce 55 tons per day of something which had never been produced in quantities over a few pounds a day. It wasn't long, however, before we learned that the urgency lay in the fact that if we blended this chemical in with our cordite we could produce a power which gave no flash from the gun even at night. That explained a lot, because we knew that range-finders operated on calculations made from the flash of guns, and the flash also gave away the position of anti-aircraft guns.



C. F. Pearce, Winnipeg industrialist who did a good war job, enjoys chat with Mr. Donald.

To make a long story short, experimental and pilot plant work was immediately instituted and construction started. In ten months we were producing the much wanted chemical. But the original need was greatly increased with the development of radar. All the advantages of radar in a night action were lost when the flash from our own guns illuminated our ships, making them visible to the enemy who was not equipped with radar. As a young naval officer said in discussing the matter: "If you do not get them with the first salvo you should see the stuff come back."

Our most interesting groups were the synthetic ammonia plants built to supply ammonia for the manufacture of nitric acid required in explosives and for the manufacture of ammonium

nitrate. The latter when mixed with T.N.T. makes an excellent high explosive mixture known as amatol.

## SPIRIT OF COLLABORATION

Synthetic ammonia plants are large, complicated and costly. The big compressors and convertors have to be built to operate at 4,500 lbs. to the square inch and had to come from the United States. We made our plans: First to expand production at Trail by 100 tons per day; secondly, to build a plant for 100 tons per day at Niagara Falls in conjunction with our nitroguanidine plant; and, thirdly, to erect a plant at Calgary for 150 tons per day of ammonia. With these planned and under construction we then had to develop a force of operators. Young Canadian chemical engineers were selected from industry and the universities and sent for training to Trail and to the United States.

Within about one year from starting construction we brought the plants into operation. The Calgary plant is a particularly fine job and an example of the kind of co-operation that won the war. It was designed to make use of natural gas as a source of hydrogen, and was the first plant of its kind in North America. The design was a joint operation of a team of engineers sent from the United Kingdom by Imperial Chemical Industries and the engineers of Consolidated Mining and Smelting Company. I believe it is the finest ammonia plant on the continent, and one of the lowest cost producers.

But with these plants in operation our problems were not all solved. Our program was undertaken to supply the United Kingdom, based on the theory that the great Billingham plant in England would be bombed out of commission. It was bombed, but not put out of commission. When our plants started to operate in 1941 the United Kingdom did not require our production. Here we were with the better part of \$30,000,000 invested in ammonia and ammonium nitrate plants, and no demand.

It was one of our many crises. I went to Washington to discuss the matter with my friends in the U.S. Ordinance.

From left: W. H. Renfo, C. A. Malden, David Cooper, flanked by his two sons, and J. B. Wallace, assistant secretary Industrial Development Board.



Before I could even state my case I was asked how much ammonia and ammonium nitrate we could let them have. The upshot of the matter was that for two years they took all we could give them, and our supply was an important factor in the building up of explosives production in the United States until their own new ammonia plants came into operation.

### SOLVES PEACETIME PROBLEM

By the spring of 1943 U.S. production had caught up with explosive demand, the United Kingdom plants were still producing, and again we were threatened with idle plants. Once more I travelled to Washington and this time was directed to the U.S. Department of Agriculture. Nitrogen for fertilizers was very short because all the ammonia was being directed to explosives. We received a warm reception, but the question arose as to whether ammonium nitrate could be satisfactorily used as a fertilizer. It had one serious disability. When packed in bags and stored it caked, and the fine crystals we produced became solid rock.

Unless we could remedy the situation we were sunk. We talked to various authorities in the United States and were told that nobody had succeeded in making ammonium nitrate free-flowing. We put the problem up to our producing plants and research chemists. The problem was brilliantly solved by the Calgary plant changing the physical form of the nitrate from a fine crystal to a small spherical shot.

In its new form Canadian ammonium nitrate has become a preferred fertilizer material and shipped all over

the allied world to meet the fertilizer shortage and boost food production. Large quantities are being used in the United States.

These ammonia plants, built as a wartime necessity as part of our explosives program, are now operating at full capacity as fertilizer plants, and helping to alleviate the drastic food shortage threatening the world. Export sales have paid off the original capital investment. It seems certain that everything they can produce will be required for some time. They are a valuable addition to Canada's peacetime industry. Those familiar with agriculture will appreciate the possibilities of an ample supply of fertilizer nitrogen at low prices.

### NEW POWERFUL EXPLOSIVE

The story of Canada's participation in the development of the new high explosive known as R.D.X. will bear repeating. R.D.X. which stands for Research Department X, was developed by the British Explosives Research Department at Woolwich prior to the war. It was a well known explosive, cyclonite or, chemically, cyclo-trimethylene trinitramine but the British Research chemists had discovered how to make this powerful and sensitive explosive safe for military purposes. It has something like 40% greater explosive power than T.N.T.

I cabled a well known Canadian organic chemist, then resident in London, in 1939, asking him if he would return and assist me in directing research in our explosives program. Dr. J. H. Ross joined our group early in 1940. One of his first jobs was the question

of an improved method of R.D.X. manufacture and, under his direction in the chemical laboratories of McGill University, this work was carried on. It was in Spring of 1941 that Dr. Ross stated that in this work they had developed what seemed to be a promising new method of manufacture. It was radically different from the existing method, requiring different raw materials. In view of the raw materials required it was decided to carry out a pilot plant operation in collaboration with Shawinigan Chemicals Limited at Shawinigan Falls. This work was so successful that full-scale operation was indicated. There still remained some practical questions to be decided. Was the explosive produced by this new method absolutely identical with the R.D.X. produced by the British method? It was extremely important that this point be cleared up, as any difference in character might result in difficulties in Service, such as decomposition, instability, difference in power, etc. The only way to clear these points up was to send a sample to England.

After some consideration we decided to try and ship by air. It was in the early days of trans-Atlantic crossings and the Ferry Command naturally viewed with some suspicion the idea of carrying 10 lbs. of super-explosive in one of their plans, when a  $\frac{1}{4}$  of a lb. was ample to destroy the plane. However, the urgency of the matter was explained and it was finally arranged that Dr. Ross and Dr. Sutherland of Shawinigan Chemicals Limited, who was associated in the pilot plant work, would fly the Atlantic with the explosive and discuss the whole matter with





The spotlight in this group is held (in centre) by L. J. Rust, president Brandon Board, flanked on right by D. A. Smith. From left, other members of the party are, Erich Weber, member Executive Committee, B. J. Sequin, W. R. Lowrie, B. R. Wolfe, Transcona, and A. V. Gibbons.

the Research authorities at Woolwich. The final results were cabled to Canada. Based on detailed information we started construction of a plant for full-scale production of this explosive.

Throughout this development we had kept the explosive and research authorities in the United States familiar with what was going on. Work on the process was also being carried out in other Canadian Research Laboratories. By the time our full-scale plant was well under construction, the result of this additional international co-operative research had greatly improved the method of manufacture and the efficiencies of the process. The process finally developed produced R.D.X. at costs comparable with T.N.T. and at considerable savings over the older method of manufacture.

Recently I had the pleasure of visiting the large R.D.X. plant built by the U.S. Government to make R.D.X. by this process which all sprang from the initial work at McGill University. It is the finest explosive plant I have ever seen. It cost some \$125,000,000, spread over 7,000 acres, and produced sufficient R.D.X. to enable it to be used in super-bombs and for most essential purposes. It was a remarkable development.

#### AIMED AT ECONOMY

Despite the size and urgency of our program we never lost sight of the necessity for economy. Wherever possible our plants were planned with a view to post-war usefulness. The explosive plants, which we felt would have little post-war value, were all wooden buildings similar to the type of construction in the mining country.

Costs were continually lowered as experience was gained. The actual costs of explosives were less than anticipated, and much below 1914-18. Technical information was continually exchanged between the United Kingdom, the United States and Canada, with excellent results to all concerned.

One problem which we tackled early in the war was the use of woodpulp instead of cotton linters for the manufacture of guncotton. Our plants initially used cotton linters imported from the United States. We eventually switched over to the use of woodpulp, thus utilizing a raw material available in Canada and effecting marked economies in manufacture.

In the latter part of 1944 we were faced with a sudden increased demand for T.N.T. At that time our operations had been slowed down and the Nobel plant closed. Due to a change from defensive to offensive warfare on the part of the Allies, some 2,000,000 anti-tank mines became surplus, each containing 8 lbs. of T.N.T. These mines were shipped to the Nobel plant, broken down, some 16,000,000 lbs. of T.N.T. recovered, and a saving of something like \$900,000 effected.

A change in the T.N.T. process developed by Canadian Industries Limited at Beloeil enabled us to almost double the output of T.N.T. from the same equipment. This process was applied to all plants, enabling them to increase production at practically no capital cost. This development was also applied in the United States, making large capital savings in their T.N.T. plant program.

Just how did we put together the necessary organization to carry out this vast program? We first drew on the universities and Civil Service, but with increased activity early in 1940 it became necessary to greatly enlarge our staff and to obtain chemical engineers with wide industrial experience. The men we wanted could not be obtained within the ordinary machinery of the Civil Service.

We overcame this difficulty by borrowing men from companies and having them charge us for their services. We also had able voluntary assistance. I shall always be grateful to this original group. Their capacity for work seemed unlimited.

#### CAPABLE ADMINISTRATION

But with the growth of our program it soon became evident that more elaborate machinery was required to administer the large Government expenditures being made. This problem was solved by the formation of Allied War Supplies Corporation, a Crown-owned company, and we secured as President of this company Mr. Harold Crabtree, at that time President of the Canadian Manufacturers' Association. Under his able administration Allied War Supplies built up the necessary organization to supervise the construction and operation of the large government-owned and financed plants.

Allied War Supplies, in turn, entrusted actual management of the various projects to strong Canadian manufacturing companies. Some measure of the success of their operation lies in the fact that practically all the plants

we constructed eventually produced some 50% over the original designed capacity. I would also remind you that Canada experienced no major accidents in her explosives program.

From the outset our program was an Empire one, and we worked closely with similar programs in the United Kingdom. We enjoyed the friendliest relationships with the United States, and, in the field of international co-operation, no happier associations ever existed. From the beginning of the war I realized that our effort here must, of necessity, be largely dependent upon the United States for many raw materials and also for equipment and engineering.

From the outset we received the greatest co-operation, and my friends in U.S. Industry assured me that anything we asked was ours. They were as good as their word. Early in 1940 we established contacts with U.S. Government agencies such as the War Production Board and the Ordnance Departments of the U.S. Army and Navy. Although the United States was not then at war, their assistance in many instances proved invaluable.

#### TEAMWORK PREVAILED

The co-operation achieved in our explosives and chemical program was an important factor in the creation of the Joint War Production Committee of Canada and the United States which functioned so successfully in co-ordinating the Canadian and American supply programs after the United States entered the war.

In 1942, Colonel J. P. Harris, who was in charge of the U.S. explosives program, visited Great Britain with me to discuss plans and further integration of our programs with Dr. Armit, Director General of Explosives in the United Kingdom. In 1943 Dr. Armit visited Canada and the United States, at which time the explosives programs were again re-examined and co-ordinated in view of plans for the coming offensive. From that time Canadian, U.K. and U.S. operated almost as a unit, with supplies being allocated from the common pool to all Allied countries.

You may well ask now the war is over what we will salvage from our program. The explosive plants proper, like tanks, battleships or bombers will have little post-war value. On the other hand many of our chemical plants will continue to operate as part of our post-war industry and will prove an important factor in our economy. Some have already been taken over by private industry. But over and above the material value of the plants is the experience obtained by management and technologists in large scale chemical processes involving the most advanced techniques.

Many Canadian chemists and engineers have crowded into a few years what would ordinarily represent the experience of a life-time. Canada thus enters the post-war period with a greatly expanded chemical industry and with the experience and personnel to fully participate in the future expansion of chemical industry which is undoubtedly ahead.

In a period of six years of intensive effort one has many interesting and exciting experiences, but my most memorable was undoubtedly the visit I paid to Great Britain and Germany last July. I had seen the damage in the United Kingdom in 1942 and I was shocked at the further damage from buzz bombs and rockets. I was also shocked by the standard of living which, to one from this continent, seemed to be pretty much on the floor:—Shortages of so many of the things that we regard as necessities.

#### VISIT TO GERMANY

Together with Dr. Armit, Director General of Explosives for the United Kingdom, I flew to Germany and we motored through a good deal of North-West Germany, visiting explosive and chemical plants. It is almost impossible to describe the destruction which has taken place in Germany. The once great German cities are a mass of ruins and rubble, with the centres of the cities completely destroyed and the damage gradually tapering off to the suburbs.

If Winnipeg had been one of the German cities, as I saw them, the entire central area, representing 60% of the population, would be in ruins; the railway stations and yards be a shambles; and there would be no bridges left over the rivers. To remove the ruins and rubble is a tremendous job in itself, much less the re-building.

I saw Frankfurt, Cologne, Essen, Dusseldorf, Hamburg and various other cities, and the same thing holds

From left: G. A. Wrighton, C. D. Penner, Steinbach's optimistic president of the Board of Trade, R. B. Hunter and A. Barton.



true. I spent several hours in a motor-boat going up and down the harbour at Hamburg. It was an absolutely fantastic and unbelievable sight.

Once outside the cities the countryside appeared in good order and damage to industry outside the big cities was relatively slight. It is impossible, however, to describe the chaotic conditions as we saw them. Mechanical transport was practically at a standstill, except for motor traffic limited to the Army. People were on the move in every direction, mostly on foot, but with odd vehicles drawn by horses, cows, or human beings. It was self-evident that Hitler had done what he said he would do — pulled the whole German people down with him and most of Europe also.

And over Germany lay the realization of defeat. We talked to the management of a number of the large chemical plants, to research chemists and others and their one question was "How can we get to America? There is nothing ahead of us here and no future for us or for our families."

As we travelled through Germany and saw the destruction and misery and hopelessness of the situation, we reached certain conclusions which may interest you: First of all, we decided that if there were another war there were a number of self-evident precautions: These were:—1. Do not live in a big city; 2. Do not live near a railway or major high-way; 3. Whatever you do, do not live near a railway junction; 4. Preferably live in a deep and well-wooded valley.

It is impossible here to appreciate



From the left: Mayor W. A. Joyce, I. W. McLandress, I. Telmer, W. P. Barrett, T. C. Rudd, J. P. McNichol, M. Bunn and M. L. Parr.

the conditions as they exist in Europe today, and the gulf in thinking between Europe and North America is the result. Probably the greatest barrier to world understanding lies in the fact that we, in the Americas, have never suffered from bombing or other direct enemy action.

### SOME COSTLY LESSONS

One hears today a good deal of loose talk about another world war. I do not believe the people who talk glibly of fighting the Russians or anybody else appreciate the implications of another war. The destruction in this war has been enormous. The loss of civilian life in Germany from the air raids was very heavy, and there is untold misery still to come. All this was accomplished with weapons and explosives which are already obsolete.

Atomic energy makes the power of all our ordinary explosives insignificant. Rockets, planes and the atomic bomb make it certain that in another world war cities like Winnipeg will be inevitably wiped out. If I were con-

vinced that another world war were approaching I would waste no time in moving to the deep and well-wooded valley I have already referred to.

If the war has proved anything, it has proved that production problems can always be solved, but the world problem today is that of human relationships. This is the problem that must be solved by men of tolerance and goodwill. It is therefore a challenge to every one of us.

What of the future? It seems evident that Europe will be unable to supply the export markets of the world as in the past for a considerable period of time. In the East the destruction of Japan's industries has, in the same way, eliminated Japan as an export factor. As a result the world must face a shortage of manufactured goods for a considerable period.

It is, therefore, a reasonable assumption that Canadian industry is facing a considerable period of expansion not only to satisfy our own needs but also for export purposes. If, coupled with this industrial expansion, Canada adopts a rational immigration plan, the increase in Canadian demands should take up the slack as exports from Europe are increased. A large industrial expansion took place following the war of 1914-18. A similar expansion seems indicated again.

The success of any community can be measured by the calibre of the people in it. One cannot spend much time in the province without reaching the conclusion that the people of Manitoba will take full advantage of their opportunities.

Left to right: J. E. Blakeman, Ald. H. B. Scott, H. Lynn, Dr. R. Sternsheim, E. Nyman, F. Malby and J. L. Norrie.

Inset: Transcona Threesome, Mayor A. R. Paulley, Dr. Murdock McKay and M. J. G. McMullen, member New Industries Committee.

